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1986

FLOOD INSURANCE STUDY

COMPLETED 34

CITY OF CAMBRIDGE, OHIO

GUERNSEY COUNTY

ORIGINAL

MARCH 18, 1986

Federal Emergency Management Agency

COMMUNITY NUMBER - 390200

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TABLE OF CONTENTS

		Page
1.0	INTRODUCTION	1
1.1	Purpose of Study	1
1.2	Authority and Acknowledgements	1
1.3	Coordination	2
2.0	AREA STUDIED	2
2.1	Scope of Stu. y	2
2.2	Community Description	2
2.3	Principal Flood Problems	4
2.4	Flood Protection Measures	5
3.0	ENGINEERING METHODS	5
3.1	Hydrologic Analyses	5
3.2	Hydraulic Analyses	6
4.0	FLOOD PLAIN MANAGEMENT APPLICATIONS	7
4.1	Flood Boundaries	7
4.2	Floodways	7
5.0	INSURANCE APPLICATION	11
5.1	Reach Determinations	11
5.2	Flood Hazard Factors	12
5.3	Flood Insurance Zones	12
5.4	Flood Insurance Rate Map Description	13

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TABLE OF CONTENTS (continued)

		Page
6.0	OTHER STUDIES	13
7.0	LOCATION OF DATA	13
8.0	REFERENCES AND BIBLIOGRAPHY	15

FIGURES

Figure 1 -	Vicinity Map	3
Figure 2 -	Floodway Schematic	11

TABLES

Table 1 -	Summary of Discharges	6
Table 2 -	Floodway Data	8
Table 3 -	Flood Insurance Zone Data	14

EXHIBITS

Flood Profiles

Wills Creek	Panels 01P - 03P
Leatherwood Creek	Panels 04P - 05P

Flood Boundary and Floodway Map Index
Flood Boundary and Floodway Map

PUBLISHED SEPARATELY:

Flood Insurance Rate Map Index
Flood Insurance Rate Map

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FLOOD INSURANCE STUDY

CITY OF CAMBRIDGE,
GUERNSEY COUNTY,
OHIO

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the City of Cambridge, Guernsey County, Ohio, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood risk data for various areas of the community that will be used to establish actuarial flood insurance rates and assist the community in its efforts to promote sound flood plain management. Minimum flood plain management requirements for participation in the National Flood Insurance Program are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

In some states or communities, flood plain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the state (or other jurisdictional agency) will be able to explain them.

This Flood Insurance Study was prepared by compiling existing hydrologic and hydraulic technical and scientific data prepared originally for purposes other than the National Flood insurance Program. The data were identified as the best available at the time of compilation of this Flood Insurance Study and should depict the general conditions of the flooding sources with relative accuracy. The Federal Emergency Management Agency (FEMA) performed a cursory review and accepted the data as valid for purposes of this Flood Insurance Study and the National Flood Insurance Program. However, if better information is known to exist or has been developed since the date of this report, the information should be immediately forwarded to the Natural and Technological Hazards Division, Federal Emergency Management Agency, Chicago, Illinois, for consideration for revision of this study.

1.2 Authority and Acknowledgements

The sources of authority for this Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic analyses were performed by the U.S. Army Corps of Engineers (COE), and the hydraulic analyses were performed by FEMA and the U.S. Soil Conservation Service (SCS). Information for the analyses was taken from the COE Flood Plain Information report (Reference 1).

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1.3 Coordination

On May 11, 1982, the results of the work were reviewed and accepted at a final coordination meeting attended by representatives of FEMA and the community.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the City of Cambridge, Guernsey County, Ohio. The area of study is shown on the Vicinity Map (Figure 1).

Wills and Leatherwood Creeks were studied by detailed methods within the corporate limits.

Approximate methods of analysis were used to study all remaining areas having a potential flood hazard that did not have available detail scientific or technical data. The scope and methods of study were proposed to and agreed upon by FEMA and the City of Cambridge.

2.2 Community Description

The City of Cambridge is located in west-central Guernsey County in east-central Ohio. The city is surrounded by the unincorporated areas of Guernsey County and is 79 miles west of Columbus, Ohio, and 119 miles south of Cleveland, Ohio. In 1980, the population was reported to be 13,578 (Reference 2).

Settlers arrived in the area of Cambridge about the beginning of the 19th Century from the island of Guernsey, after which the county is named. The town was laid out in 1806 and incorporated in 1837.

Industries in and around Cambridge include strip mining, manufacturing of plastics, pottery, glass and glassware, furniture, wood articles, kitchen utensils, spark plugs, small motors, and metal alloys. The surrounding agricultural region produces corn, wheat, and oats.

The climate in the Cambridge area is temperate with warm summers and moderately cold winters. Average annual precipitation is 39 inches and is well-distributed throughout the year.

Wills Creek, formed by the junction of Buffalo Fork and Buffalo Creek, is joined approximately 10 miles above Cambridge by Seneca Fork, a major tributary draining northeastern Noble County and northwestern Monroe County. Streamflow on Seneca Fork is regulated by a dam forming Senecaville Lake that controls a drainage area of 121 square miles.

Wills Creek flows generally northwestward to Cambridge, then northward on a meandering course and finally westward to join the Muskingum River. The width of the valley varies from 2,000 to 5,000 feet. The average fall of the stream from Seneca Fork to Crooked Creek, north of Cambridge, is 0.8 foot per mile.

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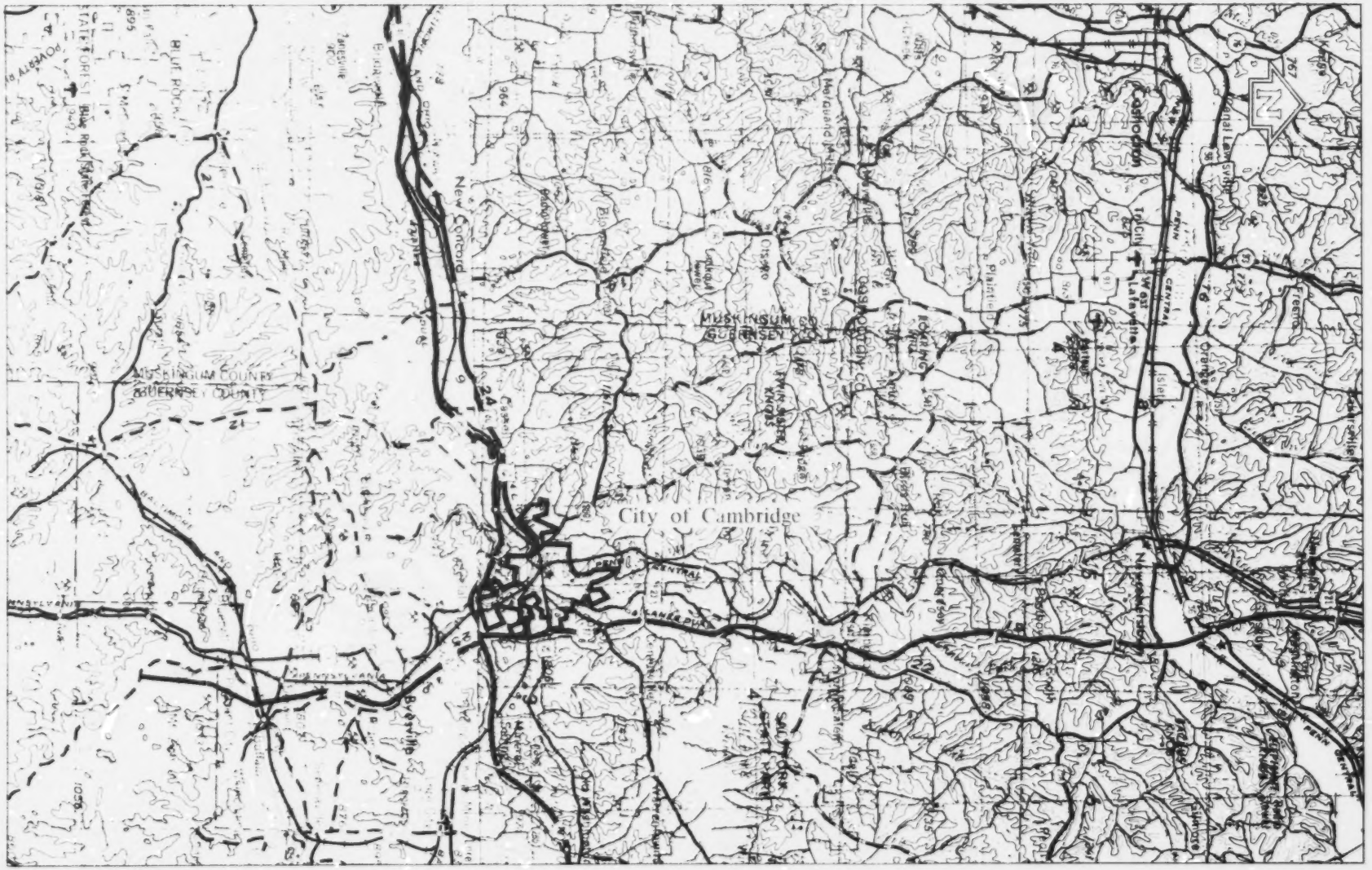

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF CAMBRIDGE, OH
(GUERNSEY CO.)

APPROXIMATE SCALE

4 0 4 8 12 MILES

VICINITY MAP

FIGURE 1

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Along the west side of Cambridge, the flood plain narrows and is occupied by several large industrial plants and the Cambridge sewage treatment plant. North of Cambridge, the flood plain is unoccupied except for crossings by the railroad and a few roads, scattered oil wells, and one building materials facility.

The flood plain of Leatherwood Creek, from the upper study limit to the crossing of Interstate Highway 77, is largely undeveloped. West of the Interstate Highway 77 crossing, the flood plain is occupied by the Chessie System, roadways, and the residential and industrial developments of East Cambridge.

2.3 Principal Flood Problems

Floods on Wills Creek usually are caused by runoff from excessive precipitation during spring months. However, floods have occurred during all seasons of the year. The stream can rise from normal flows to flood peaks in a relatively short time and recede in the same manner. The maximum rate of rise for a typical flood at Cambridge is from 0.5 to 1.0 foot per hour.

Damaging floods have occurred in the Cambridge area along Wills Creek many times throughout the history of the city. The most significant floods for which records are available occurred in 1907, 1913, 1935, 1945, 1963, 1964, and 1980. Of these, the flood of August 8, 1935, produced the highest stage and caused the most damage. The flood of August 13, 1980, produced the highest stage experienced on Wills Creek since the construction of Senecaville Lake.

Crest elevations and discharges for the highest floods on record at the U.S. Geological Survey (USGS) gaging station (No. 3142000) at Cambridge are shown below.

PAST FLOOD CREST ELEVATIONS
Wills Creek at Cambridge
USGS Gaging Station at Stream Mile 62.3

Date of Crest	Stage feet	Elevation[1]	Peak Elevation cfs[2]
August 8, 1935	25.4	797.7	11,800[3]
March 1913	23.1	795.4	12,600[3]
June 6, 1963	22.6	794.9	8,500[4]
March 11, 1964	21.8	794.1	8,370
August 1980	N/A	796.8	7,860[5]

[1]Zero elevation of gage is 772.3 Mean Sea Level Datum of 1929.

[2]Cubic feet per second (cfs). One cfs equals about 449 gallons per minute.

[3]Estimated by the COE.

[4]Peak flow occurred June 6 or 7, peak stage due to backwater from tributaries.

[5]Peak stage due to backwater from tributaries

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2.4 Flood Protection Measures

Floodflows on Seneca Fork, a major tributary of Wills Creek, are regulated by Senecaville Lake, which has been in operation principally for flood control since 1938. It provides significant reductions in flood heights along Wills Creek throughout the study area. The information presented subsequently concerning probable future flood levels reflects the reductions in flood heights attributable to Senecaville Lake. There are no floodwalls, levees, pumping stations, or other flood protection works within the study area. Wills Creek Lake controls flooding in areas downstream of the study. Its flood control pool, when utilized for storage of floodwaters, extends upstream into the study area. The Federal Government owns flowage easement rights over all lands within this reservoir area.

There are no existing flood plain zoning ordinances, building codes, or other regulatory measures designed specifically for the avoidance of flood damages along the study reaches of Wills, Leatherwood, or Crooked Creeks.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude that are expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for flood plain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10, 2, 1, and 0.2 percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long-term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood that equals or exceeds the 100-year flood (1 percent chance of annual exceedence) in any 50-year period is approximately 40 percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for each riverine flooding source studied in detail affecting the community.

The peak discharges presented in this Flood Insurance Study were computed by the COE based on the guidelines in Bulletin No. 17A (Reference 3).

Peak discharges for the 10-, 50-, 100-, and 500-year floods of each flooding source studied in detail in the community are shown in Table 1.

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TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (SQ MILES)	PEAK DISCHARGE (CFS) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
WILLS CREEK at Campbell Avenue	406	6,800	9,800	11,100	14,450
LEATHERWOOD CREEK at mouth	91.6	5,200	7,800	8,900	11,900

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals.

Cross-section data and roughness factors were taken from "Flood Plain Information, Wills Creek, Leatherwood Creek and Crooked Creek" (Reference 1).

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles. For stream segments for which a floodway was computed (Section 4.2), selected cross section locations are also shown on the Flood Boundary and Floodway Map.

Starting water-surface elevations were determined using the slope-area method. Water-surface elevations were determined through the use of the COE HEC-2 water-surface profiles generalized computer program and the SCS WSP-2 computer program (References 4 and 5).

High-water marks established during the flood of 1980 show stages considerably in excess of those anticipated from the rating curve developed for Wills Creek at the gage. This situation is the result of backwater caused by an untimely peak from Crooked Creek and reflects combined effects of Crooked and Wills Creeks that could not have been predicted by normal frequency analysis. The particular combination of events realized in 1980 is sufficiently rare that it may be discarded in Flood Insurance Study probability analysis.

Flood profiles were drawn showing the computed water-surface elevations for floods of the selected recurrence intervals.

The hydraulic analyses for this study are based only on the effects of unobstructed flow. The flood elevations shown on the profiles are, thus, considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

All elevations are referenced to the National Geodetic Vertical Datum of 1929. Elevation reference marks used in this study are shown on the map.

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4.0 FLOOD PLAIN MANAGEMENT APPLICATIONS

The National Flood Insurance Program encourages state and local governments to adopt sound flood plain management programs. Therefore, each Flood Insurance Study produces maps designed to assist communities in developing flood plain management measures.

4.1 Flood Boundaries

To provide a national standard without regional discrimination, the 1 percent annual chance (100-year) flood has been adopted by FEMA as the base flood for flood plain management purposes. The 0.2 percent annual chance (500-year) flood is employed to indicate additional areas of flood risk in the community. For each stream studied in detail, the 100- and 500-year flood plain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic maps at a scale of 1:4800 with a 2-foot contour interval (Reference 6).

For the streams studied by approximate methods, only the 100-year flood plain boundary was delineated using Flood Hazard Boundary Map for the City of Cambridge (Reference 7).

The 100- 500-year flood plain boundaries are shown on the Flood Boundary and Floodway Map. In cases where the 100- and 500-year flood plain boundaries are close together, only the 100-year flood plain boundary has been shown. Small areas within the flood plain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

4.2 Floodways

Encroachment on flood plains, such as structures and fill, reduces the flood-carrying capacity, increases the flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of flood plain management involves balancing the economic gain from flood plain development against the resulting increase in flood hazard. For purposes of the National Flood Insurance Program, a floodway is used as a tool to assist local communities in this aspect of flood plain management. Under this concept, the area of the 100-year flood plain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream plus any adjacent flood plain areas that must be kept free of encroachment so that the 100-year flood can be carried without substantial increases in flood heights. Minimum Federal standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced.

The floodways presented in this study were computed on the basis of equal conveyance reduction from each side of the flood plain. The results of these computations were tabulated at selected cross sections for each stream segment for which a floodway was computed and are presented in Table 2, Floodway Data.

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FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET)
WILLS CREEK								
A	100	582[2]	12,103	1.0	794.4	794.4	795.4	1.0
B	998	923[2]	15,727	0.8	794.5	794.5	795.5	1.0
C	3453	536[2]	9524	1.3	794.5	794.5	795.5	1.0
D	3573	600[2]	11,561	1.0	794.6	794.6	795.6	1.0
E	4852	755	12,870	0.9	794.7	794.7	795.7	1.0
F	5961	1272[2]	18,696	0.6	794.7	794.7	795.7	1.0
G	6964	988[2]	14,377	0.8	794.7	794.7	795.7	1.0
H	8020	511[2]	7686	1.6	794.7	794.7	795.7	1.0
I	9023	300[2]	5662	2.1	794.8	794.8	795.8	1.0
J	9868	120[2]	3596	3.3	794.8	794.8	795.8	1.0
K	9992	106[2]	3368	3.5	795.1	795.1	796.0	0.9
L	20,534	569[2]	6571	1.7	795.8	795.8	796.8	1.0
M	21,431	679[2]	8120	1.4	795.8	795.8	796.8	1.0
N	22,435	882[2]	10,762	1.0	795.9	795.9	796.9	1.0
O	23,174	875[2]	10,528	1.0	795.9	795.9	796.9	1.0
P	23,596	860[2]	8958	1.2	795.9	795.9	796.9	1.0
Q	24,652	413[2]	6033	1.8	796.0	796.0	797.0	1.0
R	26,553	294[2]	5356	2.1	796.1	796.1	797.1	1.0
S	27,873	276[2]	5711	1.9	796.2	796.2	797.2	1.0
T	28,982	516[2]	7741	1.4	796.3	796.3	797.3	1.0
U	30,038	347[2]	6442	1.7	796.4	796.4	797.4	1.0
V	31,041	245[2]	4575	2.4	796.6	796.6	797.6	1.0
W	31,184	225[2]	4772	2.3	797.0	797.0	798.0	1.0
X	31,516	323	6638	1.7	797.1	797.1	798.1	1.0
Y	31,637	322	6686	1.7	797.8	797.8	798.8	1.0
Z	32,519	437	7145	1.6	797.9	797.9	798.9	1.0

[1]FEET ABOVE CORPORATE LIMITS
[2]THIS WIDTH EXTENDS BEYOND CORPORATE LIMITS

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF CAMBRIDGE, OH
(GUERNSEY CO.)

FLOODWAY DATA

WILLS CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET)
WILLS CREEK								
AA	33,602	216	5482	2.0	797.9	797.9	798.9	1.0
AB	33,738	154	4170	2.7	798.0	798.0	799.0	1.0
AC	34,869	360	7990	1.4	798.0	798.0	799.0	1.0
AD	35,687	272	6283	1.8	798.2	798.2	799.2	1.0
AE	35,832	193	4618	2.4	798.2	798.2	799.2	1.0
AF	36,770	230	5032	2.2	798.3	798.3	799.3	1.0
AG	37,720	297	5813	1.9	798.4	798.4	799.4	1.0
AH	37,862	191	5004	2.2	798.4	798.4	799.4	1.0
AI	38,492	197	4700	2.4	798.4	798.4	799.4	1.0
AJ	38,993	130	3352	3.3	798.5	798.5	799.5	1.0
AK	39,125	119	3037	3.7	799.0	799.0	800.0	1.0
AL	39,653	222[2]	4893	2.3	799.1	799.1	800.1	1.0
AM	42,716	410	12,071	0.9	799.3	799.3	800.3	1.0
AN	42,857	542	11,274	1.0	799.7	799.7	800.7	1.0
AO	43,460	900	14,361	0.8	799.7	799.7	800.7	1.0
AP	43,575	977	21,284	0.5	799.8	799.8	800.8	1.0
AQ	44,675	1030[2]	15,643	0.7	799.8	799.8	800.8	1.0
AR	45,361	1870[2]	33,864	0.3	799.8	799.8	800.8	1.0
AS	46,470	2276[2]	38,701	0.3	799.8	799.8	800.8	1.0
AT	49,268	780[2]	11,029	1.0	799.8	799.8	800.8	1.0
AU	50,351	1026[2]	17,575	0.6	799.9	799.9	800.9	1.0
AV	51,512	1478[2]	21,944	0.5	799.9	799.9	800.9	1.0
AW	52,647	2333[2]	33,091	0.3	799.9	799.9	800.9	1.0
AX	53,968	2359[2]	33,759	0.3	799.9	799.9	800.9	1.0

[1]FEET ABOVE CORPORATE LIMITS
[2]THIS WIDTH EXTENDS BEYOND CORPORATE LIMITS

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF CAMBRIDGE, OH
(GUERNSEY CO.)

FLOODWAY DATA

WILLS CREEK

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FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET)
LEATHERWOOD CREEK								
A	632	200[3]	3974	2.2	799.8	779.4[2]	800.2	0.8
B	2059	945[3]	12,850	0.7	799.8	799.6[2]	800.4	0.8
C	2904	475	7068	1.3	799.8	799.6[2]	800.4	0.8
D	3907	147	2748	3.2	799.8	799.6[2]	800.4	0.8
E	4023	174	3441	2.6	800.8	800.8	801.8	1.0
F	4137	200	3814	2.3	800.8	800.8	801.8	1.0
G	4397	439	7814	1.1	800.8	800.8	801.8	1.0
H	5177	500[3]	9468	0.9	800.8	800.8	801.8	1.0
I	6111	536[3]	9842	0.9	800.8	800.8	801.8	1.0
J	6946	475[3]	5890	1.5	800.9	800.9	801.9	1.0
K	8028	541[3]	9443	0.9	800.9	800.9	801.9	1.0
L	9929	1240[3]	21,604	0.4	800.9	800.9	801.9	1.0
M	12,199	1143[3]	18,701	0.5	800.9	800.9	801.9	1.0
N	13,942	1055[3]	16,757	0.5	801.2	801.2	802.1	0.9
O	14,892	1080[3]	17,196	0.5	801.3	801.3	802.2	0.9

[1]FEET ABOVE MOUTH
[2]ELEVATIONS WITHOUT CONSIDERING BACKWATER EFFECT FROM WILLS CREEK
[3]THIS WIDTH EXTENDS BEYOND CORPORATE LIMITS

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF CAMBRIDGE, OH
(GUERNSEY CO.)

FLOODWAY DATA

LEATHERWOOD CREEK

As shown on the Flood Boundary and Floodway Map, the floodway boundaries were computed at cross sections. Between cross sections, the boundaries were interpolated. In cases where the floodway and the 100-year flood plain boundaries are either close together or collinear, only the floodway boundary has been shown.

The area between the floodway and the 100-year flood plain boundaries is termed the floodway fringe. The floodway fringe thus encompasses the portion of the flood plain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to flood plain development are shown in Figure 2.

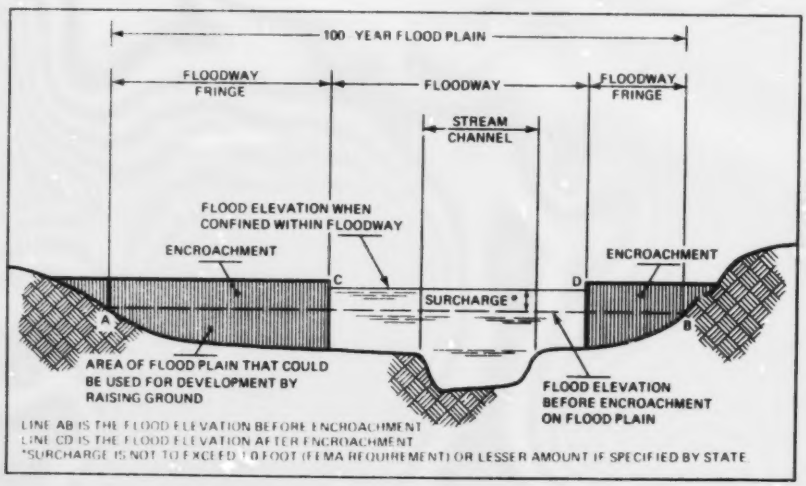
100 YEAR FLOOD PLAIN
FLOODWAY FRINGE
FLOODWAY
FLOODWAY FRINGE
STREAM CHANNEL
FLOOD ELEVATION WHEN CONFINED WITHIN FLOODWAY
ENCROACHMENT
ENCROACHMENT
C
D
SURCHARGE*
A
B
AREA OF FLOOD PLAIN THAT COULD BE USED FOR DEVELOPMENT BY RAISING GROUND
FLOOD ELEVATION BEFORE ENCROACHMENT ON FLOOD PLAIN
LINE AB IS THE FLOOD ELEVATION BEFORE ENCROACHMENT
LINE CD IS THE FLOOD ELEVATION AFTER ENCROACHMENT
*SURCHARGE IS NOT TO EXCEED 1.0 FOOT (FEMA REQUIREMENT) OR LESSER AMOUNT IF SPECIFIED BY STATE

FIGURE 2 - Floodway Schematic

The floodways in this study are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway studies.

5.0 INSURANCE APPLICATION

To establish actuarial insurance rates, data from the engineering study must be transformed into flood insurance criteria. This process includes the determination of reaches, Flood Hazard Factors, and flood insurance zone designations for each flooding source studied in detail affecting the City of Cambridge.

5.1 Reach Determinations

Reaches are defined as sections of flood plain that have relatively the same flood hazard, based on the weighted average difference in water-surface elevations between the 10- and 100-year floods. This difference may not have a variation greater than that indicated in the following table for more than 20 percent of the reach:

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Average Difference Between 10- and 100-year Floods	Variation
Less than 2 feet	0.5 foot
2 to 7 feet	1.0 foot
7.1 to 12 feet	2.0 feet
More than 12 feet	3.0 feet

The locations of the reaches determined for the City of Cambridge are shown on the Flood Profiles and summarized in Table 3, Flood Insurance Zone Data.

5.2 Flood Hazard Factors

The Flood Hazard Factor (FHF) is used to establish relationships between depth and frequency of flooding in any reach. This relationship is then used with depth-damage relationships for various classes of structures to establish actuarial insurance rate tables.

The FHF for a riverine reach is the weighted average difference between the 10- and 100-year flood water-surface elevations rounded to the nearest 0.5 foot, multiplied by 10, and shown as a 3-digit code. For example, if the difference between elevations is 0.7 foot, the FHF is 005; if the difference is 1.4 feet, the FHF is 015; if the difference is 5.0 feet, the FHF is 050. When the difference is greater than 10.0 feet, it is rounded to the nearest whole foot.

5.3 Flood Insurance Zones

Flood insurance zones and zone numbers are assigned based on the type of flood hazard and the FHF, respectively. A unique zone number is associated with each possible FHF and varies from 1 for a FHF of 005 to a maximum of 30 for a FHF of 200 or greater.

Zone A: Special Flood Hazard Areas inundated by the 100-year flood, determined by approximate methods; no base flood elevations are shown or FHFs determined.

Zones A10, A12: Special Flood Hazard Areas inundated by the 100-year flood, with base flood elevations shown, and zones subdivided according to FHFs.

Zone B: Areas between the Special Flood Hazard Areas and the limits of the 500-year flood; areas that are protected from the 100- and 500-year floods by dike, levee, or other water control structure; areas subject to certain types of 100-year shallow flooding where depths are less than 1.0 foot; and, areas subject to 100-year flooding from sources with drainage areas less than 1 square mile. Zone B is not subdivided.

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Zone C: Areas of minimal flooding; not subdivided.

Flood elevation differences, FHFs, flood insurance zones, and base flood elevations for each flooding source studied in detail in the community are summarized in Table 3, Flood Insurance Zone Data.

5.4 Flood Insurance Rate Map Description

The Flood Insurance Rate Map for the City of Cambridge is, for insurance purposes, the principal product of the Flood Insurance Study. This map contains the official delineation of flood insurance zones and base flood elevation lines. Base flood elevation lines for riverine flooding sources show the locations of the expected whole-foot water-surface elevations of the base (100-year) flood. The base flood elevations and zone numbers are used by insurance agents, in conjunction with structure elevations and characteristics, to assign actuarial insurance rates to structures and contents insured under the National Flood Insurance Program.

6.0 OTHER STUDIES

The COE, Huntington District, has published a Flood Plain Information (FPI) report that includes Wills, Leatherwood, and Crooked Creeks in the City of Cambridge and the Village of Byesville, Ohio (Reference 1). The discharges presented in this Flood Insurance Study were determined by the COE, which revised the discharges presented in the above-mentioned Flood Plain Information report pursuant to "Guidelines for Determining Flood Flow Frequency" (Reference 3). Differences between this Flood Insurance Study and the published Flood Plain Information report are justified because the hydrologic analyses reflected in this study supersede the analyses performed for the Flood Plain Information report.

Due to its more detailed analysis, this Flood Insurance Study supersedes the previously printed Flood Hazard Boundary Map for the City of Cambridge (Reference 7).

7.0 LOCATION OF DATA

Information concerning the pertinent data used in the preparation of this study can be obtained by contacting the Natural and Technological Hazards Division, Federal Emergency Management Agency, 300 South Wacker Drive, Chicago, Illinois 60606.

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FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FLOOD HAZARD FACTOR	ZONE	BASE FLOOD ELEVATION[3] (FEET NGVD)
		10% (10-YEAR)	2% (50-YEAR)	0.2% (500-YEAR)			
WILLS CREEK							
REACH 1	0001,0003	−4.7	−1.0	1.9	050	A10	VARIES—SEE MAP
LEATHERWOOD CREEK							
REACH 1	0003	−5.9	−1.7	3.0	060	A12	VARIES—SEE MAP

[1]FLOOD INSURANCE RATE MAP PANEL
[2]WEIGHTED AVERAGE
[3]ROUNDED TO NEAREST FOOT

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF CAMBRIDGE, OH
(GUERNSEY CO.)

FLOOD INSURANCE ZONE DATA

WILLS CREEK - LEATHERWOOD CREEK

8.0 REFERENCES AND BIBLIOGRAPHY

1. U.S. Army Corps of Engineers, Huntington District, Flood Plain Information, Wills Creek, Leatherwood Creek and Crooked Creek, Village of Byesville, City of Cambridge, Guernsey County, Ohio, December 1973.

2. U.S. Department of Commerce, Bureau of the Census, 1980 Census of Population, Number of Inhabitants, Ohio, Washington, D.C., February 1982.

3. U.S. Water Resources Council, Bulletin No. 17A, Guidelines for Determining Flood Flow Frequency, June 1977.

4. U.S. Army Corps of Engineers, Hydrologic Engineering Center, HEC-2 Water-Surface Profiles Generalized Computer Program, Davis, California, August 1977.

5. U.S. Department of Agriculture, Soil Conservation Service, Technical Release No. 64, WSP-2 Computer Program, May 1976.

6. Kucera and Associates, Inc., Topographic Maps, Scale 1:4800, Contour interval 2 feet: City of Cambridge, Ohio, April 1975.

7. U.S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Hazard Boundary Map, City of Cambridge, Guernsey County, Ohio, November 1975.

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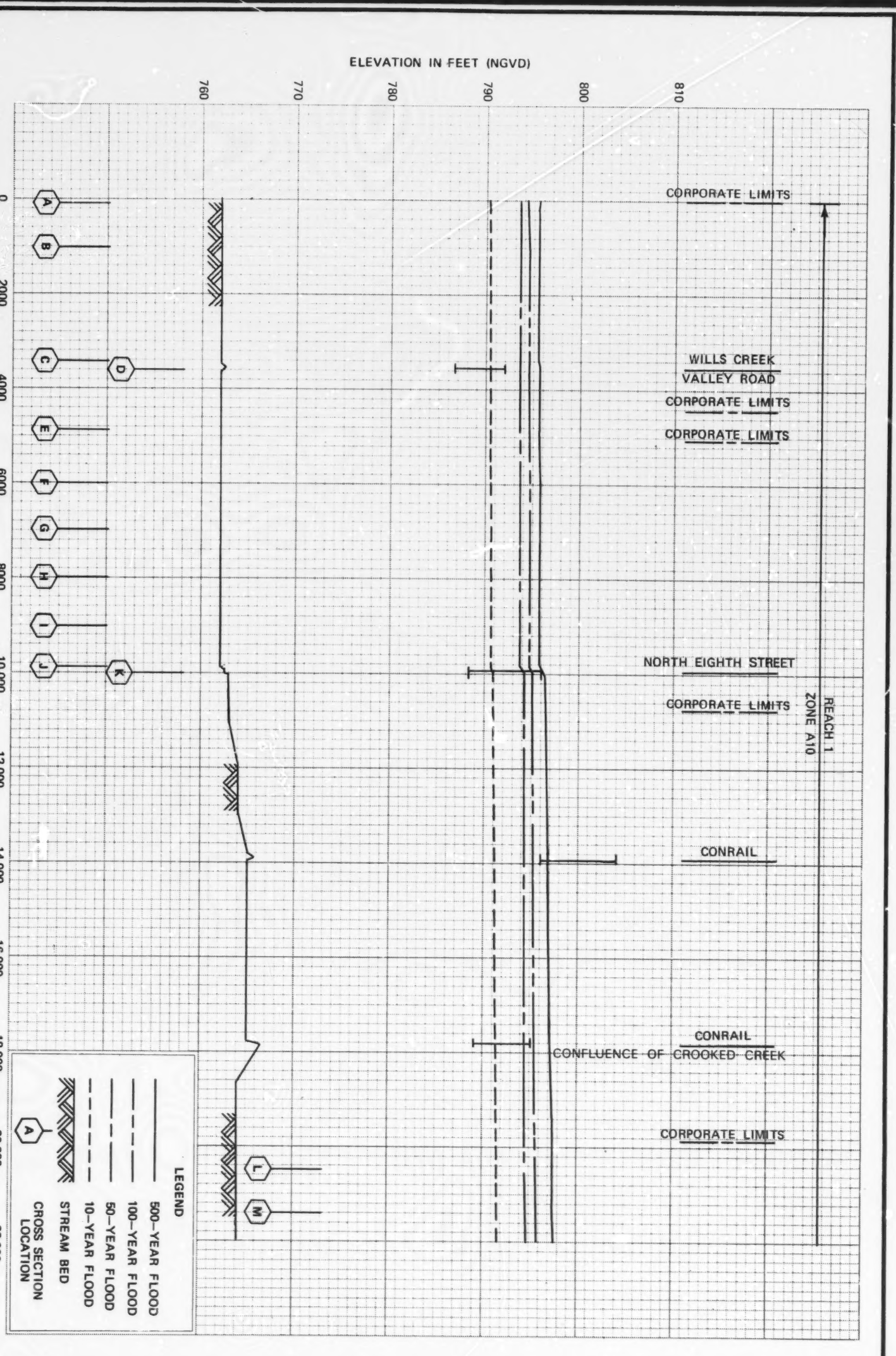

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF CAMBRIDGE, OH
(GUERNSEY CO.)

FLOOD PROFILES

WILLS CREEK

01P

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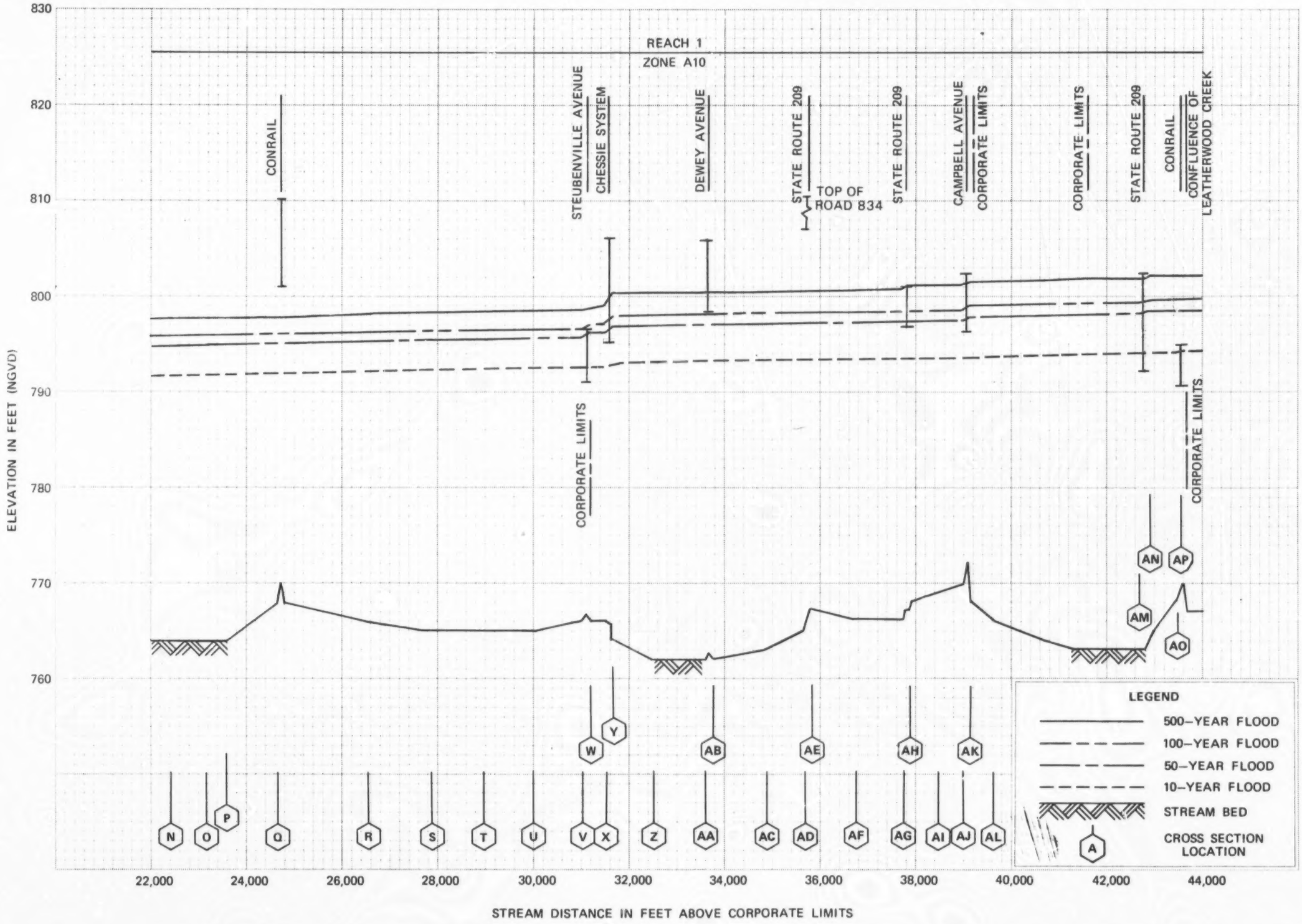

FLOOD PROFILES

WILLS CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF CAMBRIDGE, OH
(GUERNSEY CO.)

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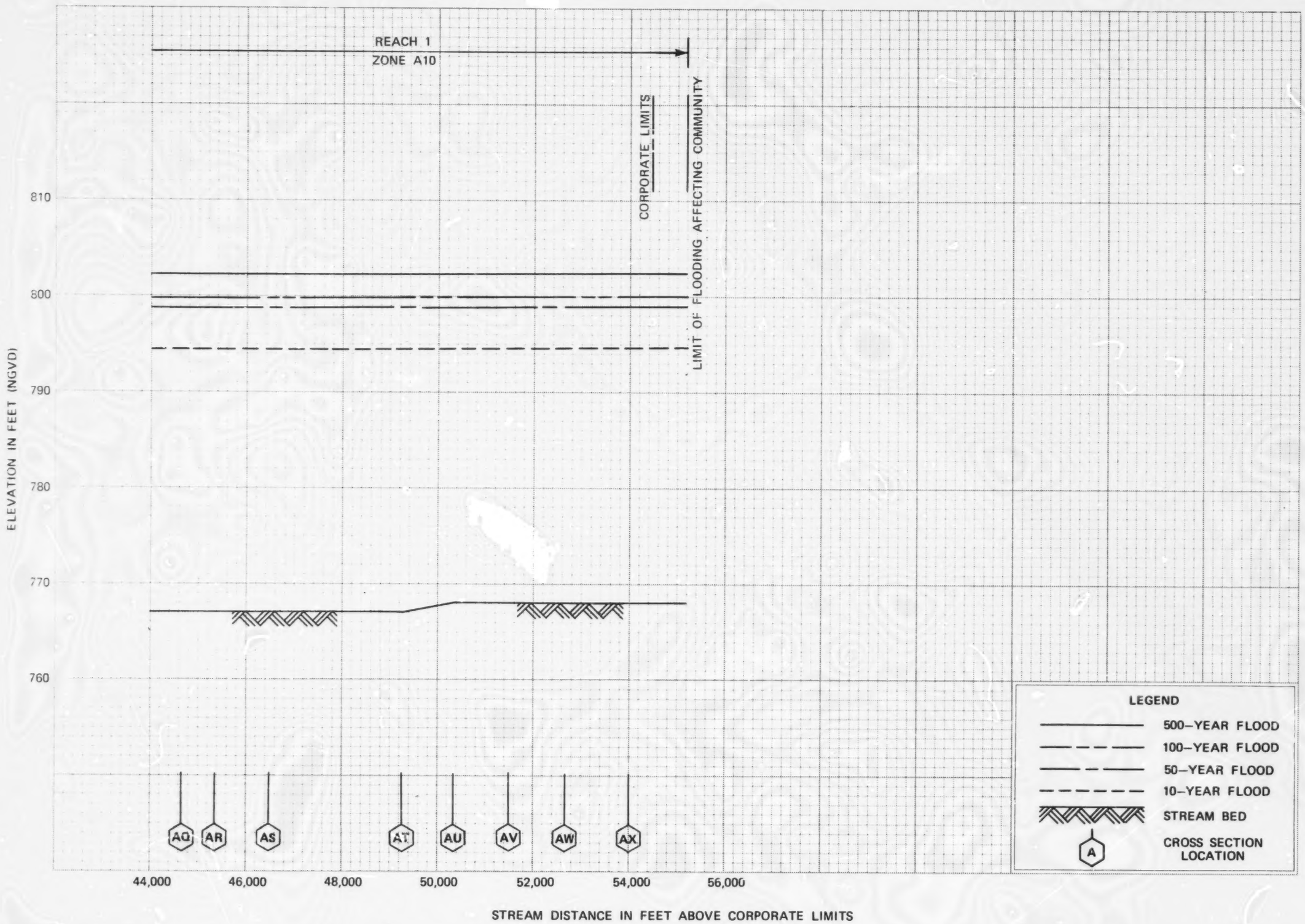

FLOOD PROFILES

WILLS CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF CAMBRIDGE, OH
(GUERNSEY CO.)

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FLOOD PROFILES

LEATHERWOOD CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF CAMBRIDGE, OH
(GUERNSEY CO.)

04P

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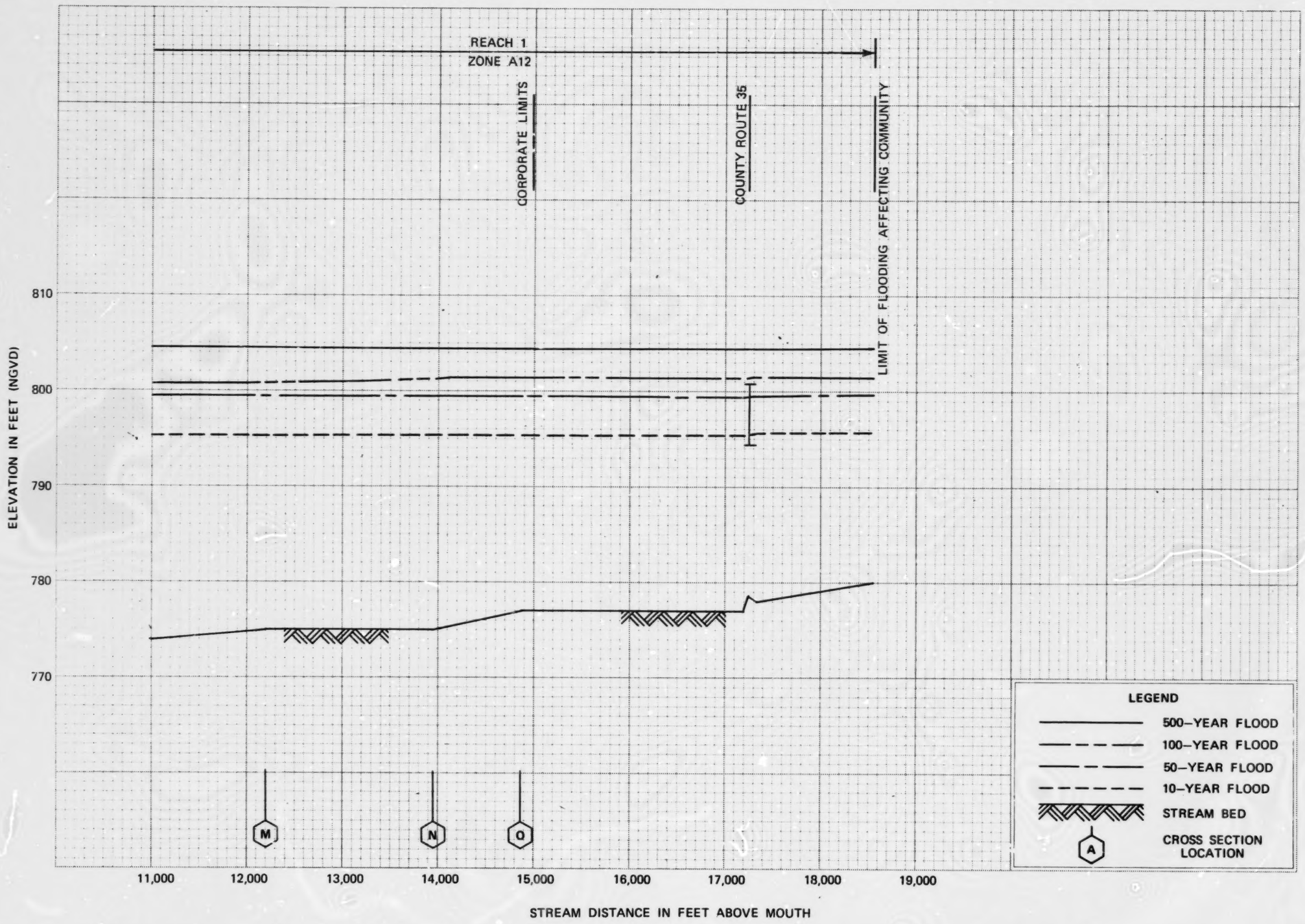

FLOOD PROFILES

LEATHERWOOD CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF CAMBRIDGE, OH
(GUERNSEY CO.)

05P

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